

CHAPTER 2 ECO-FRIENDLY EXTRACTION OF MISAI KUCING

Nicky Rahmana Putra

2.1 INTRODUCTION

In an era characterized by increasing environmental awareness and the urgent need to adopt sustainable practices, the field of natural product extraction has been undergoing a profound transformation. One plant that has attracted considerable attention within this context is misai kucing, an herbaceous perennial plant widely used in Southeast Asia for its medicinal properties. Scientifically known as *Orthosiphon stamineus*, this plant is also referred to as 'Java tea' or 'cat's whiskers.' Its historical and contemporary importance in traditional herbal medicine has stimulated extensive research into its phytochemical composition and therapeutic potential (Abdul Aziz et al., 2022).

However, the conventional methods of extracting bioactive compounds from misai kucing have often come at a cost, especially to the environment. Traditional extraction techniques such as solvent extraction are frequently associated with hazardous chemicals, excessive energy consumption and the generation of harmful waste by-products (Lee et al., 2015). This unsustainable approach compromises the ecological balance and raises concerns about the quality and safety of the extracted compounds.

A paradigm shift has occurred in misai kucing extraction in response to these challenges. Scientists and environmentalists have been diligently working towards developing innovative techniques that prioritize environmental sustainability without compromising the integrity of the extracted compounds. These innovative methods minimize the ecological footprint and enhance the quality and potency of misai kucing extracts, making them more suitable for various pharmaceuticals, nutraceuticals and cosmeceuticals.

This chapter explores the exciting developments in environmentally friendly misai kucing extraction. It delves into cutting-edge techniques and technologies that reduce the environmental impact and improve the overall efficiency of extraction process. From green solvents to novel extraction apparatus, from eco-conscious process optimization to the utilization of renewable energy sources, these innovations promise to revolutionize the field of natural product extraction.

2.2 BIOACTIVE COMPOUNDS OF MISAI KUCING

Misai kucing is an herbaceous plant that has been traditionally used in herbal medicine. It contains various bioactive compounds that contribute to its potential therapeutic properties. While the exact composition may vary depending on factors such as plant age, growing conditions and extraction methods, here are some of the notable bioactive compounds found in misai kucing:

- (1) Polyphenols: Misai kucing is rich in polyphenolic compounds, including flavonoids and phenolic acids (Pouralinazar et al., 2012). These compounds have antioxidant properties and may help to protect cells from oxidative stress.
- (2) Flavonoids: Flavonoids are a subclass of polyphenols, abundance in misai kucing (Chriscensia et al., 2023). Examples of which include quercetin, rutin and kaempferol. These compounds have anti-inflammatory, antioxidant and potential cardiovascular benefits.

- (3) Caffeic acid and rosmarinic acid: These phenolic acids have anti-inflammatory and antioxidant properties (Abdul Aziz et al., 2022). Rosmarinic acid is known for its potential to support immune function.
- (4) Essential oils: Misai kucing contains oils rich in various compounds, including terpenes (e.g., limonene, camphene), and volatile aromatic compounds (Hossain et al., 2009). These oils contribute to the plant aroma and may have therapeutic effects.
- (5) Triterpenoids: Triterpenoids are a class of compounds with potential anti-inflammatory and hepatoprotective (liver-protective) properties (Ameer et al., 2012).
- (6) Diterpenes: Diterpenes are another class of compounds present in misai kucing. Orthosiphon A and B have been studied for their potential anti-inflammatory effects (Ameer et al., 2012).
- (7) Alkaloids: Although present in lower quantities compared to other compounds, alkaloids have various pharmacological effects (Sivakumar & Jeganathan, 2018).

2.3 MICROWAVE-ASSISTED EXTRACTION OF MISAI KUCING

Misai kucing is a plant renowned for its therapeutic properties and extensive use in traditional herbal medicine. Extracting bioactive compounds from this botanical treasure has been a subject of keen interest among researchers and herbal enthusiasts alike. In the quest for efficient and environmentally friendly extraction methods, microwave-assisted extraction (MAE) has emerged as a powerful and innovative technique. MAE harnesses microwave radiation energy to facilitate extraction of compounds from plant material. It offers several advantages over conventional extraction methods, including reduced extraction time, improved yields and decreased solvent consumption. This chapter delves into the intricacies of using MAE for misai kucing, shedding light on its principles, procedures and potential applications.